

REMARKS

This paper is being provided in response to the Final Office Action dated October 28, 2008, for the above-referenced application. In this response, Applicants have amended claim 15 to clarify that which Applicants consider to be the presently-claimed invention. Applicants respectfully submit that the amendments to the claims are fully supported by the originally-filed specification. Applicants request consideration of the following remarks

The objection to the summary of the specification is hereby traversed. Applicants added a paragraph to the summary in the previous response to attempt to address the Examiner's prior comments. However, the Examiner indicated that the amendment to the summary "will not be entered, because it will not overcome the objection." Applicants submit that entire rationale for the objection to the summary is in error. Specifically, the objection on the basis of portions of the summary being a "copy of the claims" and thus not being "clearly indicative of the invention to the which the claims are directed" is inconsistently stated and does not provide a valid or even coherent reason for the objection to the summary. The Office Action cites to MPEP 608.01(d); however, MPEP 608.01(d) specifically states "the summary should be directed to the specific invention being claimed". Applicants are entitled to summarize the claimed invention in the manner of their choosing within the requirements set forth in 37 C.F.R. 1.73. The summary, as currently written, would clearly be understood by one of ordinary skill in the art and is specifically directed to the claimed invention. The rationale of the objection to the summary that is set forth in paragraph 2 of the Office Action does not provide a sufficient reason for the objection and, in fact, directly contradicts both 37 C.F.R. 1.73 and MPEP 608.01(d). This objection should be withdrawn.

The rejections of claims 15-20 and 1, 15, 21 and 32 under 35 U.S.C. 112, first paragraph, that are set forth in the paragraphs 4 and 5 of the Office Action are hereby traversed. The Office Action appears to object to the term "restoration state" indicating that the feature is not supported by the specification or drawings and would be a burden to examine. As set forth below, Applicants dispute and traverse this conclusion to the extent this conclusion and the statement of the rejections is understood by Applicants.

Applicants' claims recite that the journal entry pointing to the first storage location containing the old data provides a restoration state corresponding to the old data. Applicants further recite that the restoration state is accessible after writing the new data, and the new data and subsequent new data are kept from overwriting the old data corresponding to the journal entry. Applicants direct specific attention, for example, to page 14, line 8 page 4 and Figures 5, 6 and 7 of the originally-filed specification. Specifically, Applicants note the explicit discussion of using a journal to keep track of old data store areas, and then restoring a logical device to a prior state of the data using a journal entry. Applicants note the lines on page 14, line 21: "Thus, for example, it is possible to restore the logical device 152 to the state shown by the diagram 160 of Figure 6 by simply using the journal entry 174..." and on page 15, lines 3-4: "Similarly, it is possible to restore to the logical device 152 to the state shown by the diagram of 150 of Figure 5 by using the journal entries 166, 174...." Applicants also point out that elsewhere throughout the specification is further discussion of the use of journal entries to restore devices to states that included old data. Applicants submit that that the claims are clearly recited and are explicitly and unequivocally supported by the specification and drawings. Accordingly, Applicants traverse the above-noted rejections under 35 U.S.C. 112, first paragraph, and submit that if the

Examiner maintains the rejections set forth in paragraph 4 and 5, a more clearly defined and explicitly stated basis for the rejections is required.

The rejection of claims 15-20 under 35 U.S.C. 101 as being non-statutory subject matter is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein. Claim 15, as amended herein, recites a computer-readable storage medium storing computer software, executable by a processor, that includes executable code that is executed to perform recited functions. Applicants note throughout the specification the discussions of computer memory accessed by a processor, among other similar components discussed therein, as examples of a computer-readable storage medium. Applicant submits that claims 15-20 recite patentable subject matter in accordance with the guidelines on this issue set forth in MPEP 2106(IV)(B)(1) and in accordance with recent court precedent. Applicants note that MPEP 2106(IV)(B)(1) explicitly states:

'[F]unctional descriptive material' consists of data structures and computer programs which impart functionality when encoded on a computer-readable medium. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993)...When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized.

Accordingly, Applicants request that this rejection be reconsidered and withdrawn.

Applicants address below the rejections on prior art grounds. However, Applicants point out that it appears that the Office Action has not consider the prior amendments made by Applicants. Accordingly, the statement of the rejections set forth in the Office Action are largely restatements from the prior Office Action and directed to the prior versions of the claims, and not to the currently pending claims. As discussed above, Applicants prior amendments are fully enabled and supported by the originally-filed specification and are clearly recited. Applicants' valid amendments have not been adequately considered and Applicants are entitled to adequate consideration of the timely-filed amendments in connection with the currently pending claims. Thus, the finality of the current Office Action should be withdrawn and the currently pending claims, including the amendments previously submitted, should be adequately considered and examined.

The rejection of claims 1-2, 9-11, 14-17, 20-21, 26, 32 and 34 under 35 U.S.C. 103(a) as being anticipated by U.S. Patent No. 7,047,355 to Nakatani, et al. (hereinafter "Nakatani") in view of U.S. Patent No. 6,510,986 to Akutsu, et al. (hereinafter "Akutsu") is hereby traversed and reconsideration is respectfully requested.

Independent claim 1 recites a method of handling writing new data. The method includes creating a journal entry that points to a first storage location containing old data to be replaced by the data new data. The journal entry is maintained after writing the new data. New storage space is allocated having a second storage location. The new data is written to the new storage space at the second storage location. The old data is maintained in the first storage location after writing the new data to the new storage space at the second storage location. The journal entry

pointing to the first storage location containing the old data provides a restoration state corresponding to the old data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the old data corresponding to the journal entry. Claims 2-14 depend directly or indirectly from independent claim 1.

Independent claim 15, as amended herein, recites a computer-readable storage medium storing computer software, executable by a processor, that handles writing new data. The software includes executable code that creates a journal entry that points to a first storage location containing old data to be replaced by the new data. The journal entry is maintained after writing the new data. Executable code allocates new storage space having a second storage location. Executable code writes the new data to the new storage space at the second storage location. The old data is maintained in the first storage location after writing the new data to the new storage space at the second storage location. The journal entry pointing to the first storage location containing the old data provides a restoration state corresponding to the old data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the old data corresponding to the journal entry. Claims 16-20 depend directly or indirectly from independent claim 15.

Independent claim 21 recites a method of restoring data to a storage device. The method includes accessing a journal having a plurality of entries. Each of the entries points to prior data that existed on the storage device before a write caused the entry to be created. An entry in the journal is created for each data write to the storage device that occurred after an initial time. The

prior data corresponding to each of the plurality of entries in the journal is maintained in the storage device after each new data write after the initial time. Each entry pointing to prior data provides a restoration state corresponding to the prior data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the prior data corresponding to each entry. At least one of the entries is used to remap the storage device to point to the prior data. Claims 22-27 depend directly or indirectly from independent claim 21.

Independent claim 32 recites a journal used for continuous backup of a storage device. The journal includes a first entry that points to a first storage location containing old data replaced by new data written to the storage device. A plurality of additional entries point to respective additional storage locations containing old data replaced by new data written to the storage device. For every write to the storage device that occurs after an initial time, there is a corresponding entry. The old data corresponding to the first entry and each of the plurality of additional entries is maintained in the storage device after each new write to the storage device after the initial time. Each of the entries pointing to the storage locations containing the old data provides a restoration state corresponding to the old data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the old data corresponding to each of the entries. Claims 33 and 34 depend directly from independent claim 32.

The Nakatani reference discloses an updated data write method using a journal log. Nakatani discloses that a server, including a buffer memory, and a storage system write journal

logs and execute flush processing. Nakatani discloses that a journal log is provided to separately store a file update history in the storage system because the contents of data updating executed in the buffer memory of the server may be lost because of a failure before data is updated in the storage area in the storage system. (See col. 7, lines 39-45 of Nakatani.) The Office Action cites to col. 6, lines 4-27 of Nakatani in which is disclosed the use of pointers to manage the status of a journal log storing area after flush processing. The Office Action states that Nakatani does not disclose maintaining journal entries after writing new data.

The Akutsu reference discloses a transaction record storing device and transaction machine. The Office Action cites to Akutsu as disclosing maintaining a journal entry after writing new data, citing specifically to Fig. 7, col. 4, lines 54-59 and col. 14, lines 56-65 of Akutsu.

Applicants set forth below arguments concerning the features of the presently claimed invention that are patentable over the cited prior art. However, Applicants note that the discussion on page 10 of the Office Action appears to be the only substantive remarks in the Office Action that respond to the remarks and amendments set forth in Applicants' prior response. In this portion of the Office Action (page 10), the Office Action characterizes Applicants argument as a "continuous argument", without any further explanation, and the Office Action does not appear to address any of the other arguments previously submitted by Applicants concerning the teaching away of Nakatani from the proposed combination with Akutsu nor the explicit disclosure of Akutsu that directly contrasts with Applicants' presently-claimed invention. Specifically, the Office Action cites to col. 4, lines 54-59 of Akutsu as teaching "maintaining the

journals after writing new data." As set forth in detail below, Applicant directs attention to the immediately following lines concerning release of the storage area to allow new data to overwrite the old data in the storage area. Applicants submit the following the arguments concerning the cited prior art references in the Office Action and, as discussed below, submit that the presently-claimed invention is not taught or fairly suggested by the cited prior art taken alone or in any combination.

Applicants recite a system for managing data writes that include a journal that keeps track of all of the old data storage areas corresponding to each write of new data to a storage device. Applicants refer to FIGS. 5, 6 and 7 of the originally-filed specification in which is shown a series of new writes to a storage device and the corresponding use of journal entries to keep track of the locations of old data in the storage device. Accordingly, Applicants' presently-claimed invention provides a method and device for continuous data backup in which a storage device can easily be restored to an earlier state through the use of maintained journal entries and stored old data that is maintained in the storage device. Applicants note that logical devices, used in connection with the journal entries may be used to keep new data from being written over old data corresponding to journal entries. For example, in connection with a write operation to an area of the logical storage device that initially pointed to the storage area, a new storage area may be allocated on a new storage device and the logical storage device mapped to the new storage area. A new entry is provided to the journal where the new entry points to the storage area previously pointed to by the section of the local storage device. (See, for example, page 14, line 8 to page 15, line 4 of the originally-filed specification.)

The Office Action cites to Figures 4 and 6, col. 8, lines 30-34 and col. 9, lines 61-65 of Nakatani as disclosing "writing the new data to the new storage space at the second location, wherein the old data is maintained in the first storage location after writing the new data to the new storage space at the second storage location." However, these portions of Nakatani disclose allocation of an area of a required size for a journal log area and then incrementing an end pointer in a buffer memory by the size of the allocated area. Nakatani discloses using data in the journal logs to execute flush processing in which updated data is read from the journal log storing area into a cache. (See Col. 5, lines 6-13 of Nakatani). Nakatani specifically discloses that

When the server 1 receives the flush processing completion notification from the storage system 2, the file system manager 12 dequeues the dirty data, which is stored in the buffer memory of the server 1, from the dirty queue. As a result, the storage area in the buffer memory 13 where the dirty data has been stored is released for use in storing other data. (Col. 5, lines 38-44 of Nakatani)

Nakatani 's journal log is disclosed as being provided for new data written to a buffer memory of a storage device before being written to a storage system. Nakatani states:

The journal log is provided to separately store a file update history in the storage system 2 because the contents of data updating executed in the buffer memory 13 of the server 1 may be lost because of a failure before data is updated in the storage area in the storage system 2. *Therefore, the journal log is not necessary once data is updated in the storage area of the storage system 2.* (Col. 7, lines 39-45 of Nakatani.) (emphasis added)

Nakatani discloses a journal log system in which new updated data that is to be written to a storage system is first stored in a buffer memory in storage locations that are logged into a journal. That is, the journal log disclosed by Nakatani is for ensuring the correct writing of new data to a storage device in the event of a failure before the new data is updated in the storage area.

Accordingly, Applicants submit that Nakatani does not disclose maintaining old data in a first storage location after writing of new data to a new storage space at a second storage location as is claimed by Applicants. The Office Action then cites to Akutsu as disclosing that a journal entry is maintained after writing new data, citing specifically to Fig. 7, col. 4, lines 54-49 and col. 14, lines 56-65 of Akutsu. As further discussed below, Applicants submit that Akutsu does not disclose maintaining a journal entry after writing the new data, wherein the journal entry pointing to the first storage location containing the old data provides a restoration state corresponding to the old data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the old data corresponding to the journal entry.

However, before addressing Akutsu, Applicants point out that, as discussed in detail below above, Nakatani's disclosure explicitly states that: "Therefore, the journal log is not necessary once data is updated in the storage area of the storage system." (Col. 7, lines 39-45 of Nakatani.) Nakatani's system explicitly teaches away from the concept of a journal log as providing a restoration state for restoring a storage device to a state corresponding to old data. Instead, Nakatani's system provides for deleting a journal log once data has been written to a storage system, and may therefore be flushed from buffer memory. Applicants submits that nothing in Nakatani would lead one of ordinary skill in the art to look for a teaching of maintaining a journal entry to restore a storage device to a state corresponding to old data. Indeed, Nakatani's device explicitly provides for the release from storage space of "dirty data." Accordingly, Applicants submits that the proposed combination of Nakatani with Akutsu to

attempt to replicate the features of the Applicants' presently-claimed invention is not supported by Nakatani, and instead is explicitly taught away from by Nakatani.

Turning back to the citation of Akutsu, Applicants respectfully submit that, even if combined with Nakatani, Akutsu does not overcome the above-noted deficiencies of Nakatani with respect to Applicants' presently-claimed invention. The Office Action cites to Akutsu as disclosing maintaining electronic journal data subjected to writing in a buffer means; however, Akutsu states: "On the other hand, when the writing into the storage medium is successful (i.e. when the storage amount in the storage medium reaches the predetermined value), *an area in the buffer means storing the electronic journal data subjected to the writing is released to allow new electronic journal data to be overwritten in that area.*" (emphasis added) (See col. 5, lines 3-9 of Akutsu; see also col. 4, lines 60-67 of Akutsu.) Accordingly, Applicants submit that Akutsu does not provide for maintaining journal entries to provide for a restoration state corresponding to a state of old data, and specifically, does not disclose maintaining a journal entry after writing the new data, wherein the journal entry pointing to the first storage location containing the old data provides a restoration state corresponding to the old data, wherein the restoration state is accessible after writing the new data, and wherein the new data and subsequent new data are kept from overwriting the old data corresponding to the journal entry, as recited by Applicants.

Accordingly, Applicants respectfully submit that neither Nakatani nor Akutsu, taken alone or in any combination, teach or fairly suggest at least the above-noted features as claimed by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claims 3-8, 12-13, 18-19, 22-25, 27 and 33 under 35 U.S.C. 103(a) as being unpatentable over Nakatani in view of Akutsu and further in view of U.S. Patent No. 7,013,379 to Testardi (hereinafter "Testardi") is hereby traversed and reconsideration is respectfully requested.

The features of independent claims 1, 15, 21 and 32 are discussed above with respect to Nakatani and Akutsu. Claims 3-8, 12-13, 18-19, 22-25, 27 and 33 depend therefrom.

The Testardi reference discloses techniques in a computer system for handling data operations to storage devices. The Office Action cites to Testardi as disclosing the use of a switch that handles data operations to a storage device.

Applicants respectfully submit that Testardi does not overcome the above-noted deficiencies of Nakatani and Akutsu with respect to Applicants' claimed invention. The Office Action cites to Testardi for the use of a switch, but Testardi does not disclose, and is not cited in relation to, the features discussed above of Applicants' presently-claimed invention. Accordingly, Applicants submit that neither Nakatani, Akutsu nor Testardi, taken alone or in any combination, teach or fairly suggest at least the above-noted features as claimed by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

Based on the above, applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 508-898-8603.

Respectfully submitted,
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